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NOTES ON SOME EUROPEAN MUSEUMS.¹

EDMUND OTIS HOVEY.

WHEN the author was in Europe last year, for the purpose of attending the Seventh International Geological Congress, he improved the opportunities which presented themselves for visiting museums, paying especial attention to the departments of geology, mineralogy, and palæontology. On his return a somewhat detailed report on these matters was prepared for the authorities of the American Museum of Natural History, and this has been thought of sufficient general interest to warrant its publication. The order of presentation is essentially geographic, being very nearly that in which the museums were visited by the author. This discussion cannot claim to be complete, because the museums at Vienna and Munich are not included, these cities lying too far away from the route traversed to permit of being visited in the time at disposal.

Hildesheim. — This quaint mediæval city of northern Germany contains a large and valuable collection of various material in a confiscated monastery which has been remodeled to adapt it to museum purposes. It is called the "Roemer Museum" in honor of the public-spirited citizen who endowed it. Regarding the general museum there is not much to be said. There is much fine material on exhibition, but the general scheme of arrangement and classification and the installation are hampered by the limitations of the old monastery buildings. The director has, however, succeeded in bringing the geological department up to a high state of perfection and interest. The collection illustrating general geology consists at present of only about 350 hand specimens of rocks, but these are selected and displayed in such a manner that they give at a glance a very good idea of the most striking phenomena of the science. The collection in the cases is well supplemented by diagrams, charts, and photographs hanging upon the neighboring walls. The

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phenomena of nature thus illustrated embrace the action of mountain-building forces, of water, wind, and sand upon rock surfaces, and of volcanic activity of various kinds. The use of pictures is not only instructive, but is an addition to the attractiveness of the exhibit, and serves to call the attention of visitors to the specimens in the cases. The collection is well provided with descriptive and other labels. As proved by experience at Hildesheim, and also at the Natural History Museum in Paris, and at the Museum of Practical Geology, and the British Museum (Natural History) in London, such collections illustrating general geology may be made not only instructive, but attractive and somewhat popular as well. Here, even more than in some other departments of natural history, the popularity of the exhibit will depend largely upon the effectiveness of installation and arrangement and the clearness and completeness of labeling.

The Rock Collection embraces more than 1000 specimens on exhibition, and, besides igneous and other crystalline rocks, includes samples of sandstones, limestones, and other sedimentary rocks. The specimens consist, for the most part, of well-trimmed blocks about six by four by one to one and a half inches in dimensions. They are arranged in trays, and each is accompanied by a neat, clearly written, comprehensive label. The classification is according to a scheme of which the tabulated elaboration lies at convenient points in the cases, and may also be obtained with the printed guide. That such a collection of rocks is highly valuable to the student for systematic study goes without saying; but it is also useful to the general public for reference, because the knowledge, and consequently the literature, of the subject of petrography is rapidly increasing at the present time, and the inquiry for such collections is also on the increase. Wooden-framed cases are used exclusively throughout the museum.

Berlin.—The famous mineral collection of the Natural History Museum is arranged partly in wooden-framed cases with "A"-shaped tops, the exhibition specimens being arranged on narrow steps in these tops, while the base is provided with drawers for systematic storage. The cases display the minerals in an excel-

lent manner, but they are too high. The specimens on the top step are too far up for any but a very tall man to inspect, and such high cases interfere with the architectural effect of the room without any compensating gain in installation. Between the high cases there are narrow, flat-topped table cases, which contain the small, fine specimens and isolated crystals of the collection, the classification being strictly in accordance with that of the high cases. In the table cases white pasteboard trays with green edges are used to hold the specimens, and the effect is not pleasing ; in the "A" cases the specimens rest directly upon the step shelves, which have raised edges. The inside of the "A" cases is painted a light color (either white or gray). Wire supports of various shapes are much used for the proper display of specimens, and with excellent effect. The large collection of meteorites and the mineral specimens which are too big for the cases are disposed about the hall without reference to classification.

The labels are all written by hand with India ink. An expert penman is employed for the work, and the labels are handsome in appearance, and less expensive there than printed labels would be. Such labels are in use throughout the museum, and are strongly to be recommended on account of their durability and appearance. To return to the mineral collection: the group labels are put into neat nickel frames which stand about four inches above the trays or the shelf. The individual labels are laid in trays in the table cases, but in the "A" cases are tacked to the front of the step, just beneath each specimen. Very few of the labels contain anything but the name of the species and the locality from which the specimen came ; thus, "Fahlerz, Müsen, Westphalen." When the mineral has a "common name" recognized in Germany, that alone is used, as in the instance cited. Chemical formulæ, statements about crystalline form, etc., are relegated to the group labels. When specimens have come to the museum from some large or noted collection, that fact is indicated on the label.

The petrographic collection consists of representative hand specimens of all important kinds of rocks, arranged in table

cases, and is provided with many brief explanatory labels in addition to the individual label accompanying each specimen. Such phenomena as the effect produced on adjoining rocks by the heat of the igneous rocks when erupted or injected are fully illustrated by large, handsome specimens which have been very carefully collected and prepared for exhibition. The cases in this department also have wooden frames. The catalogue of each of these departments is in book form, and although a general catalogue has not yet been prepared, each specimen bears an accession number of such a kind that its exact location in the collection or in the storage drawers can be told at a glance.

Palæontological Collections. — The remains of animals and plants are in separate rooms. The collection of fossil animals is merely synoptic, only fine specimens being on exhibition, and includes vertebrates and invertebrates in one series, the arrangement being zoölogical. The hall is badly lighted, which greatly impairs the effect of the wonderful assemblage of fossil reptiles. Upright and table cases are used for the small and the particularly valuable specimens, but most of the large reptiles are displayed without any covering, except that some of them have a wire netting over them. The collection of fossil plants is in a well-lighted room. The specimens are very fine, and show that a collection illustrating palæobotany may be made attractive as well as instructive. A noteworthy feature of this room is a series of transparent sections of plants, mounted between glass plates and suspended in front of the windows, where one may readily examine them. This arrangement is not confined to the Berlin museum, however, and may be adapted to several classes of objects, *e.g.*, agates and corals.

Invertebrate Zoölogy. — The hall of invertebrate zoölogy is cased with iron-framed upright cases, which are about seven feet high and so arranged as to divide the room into alcoves. While a great amount of well-lighted exhibition space is thus obtained, the architectural effect of a large hall is lost by the arrangement. A new and very effective feature is a series of rectangular jars containing illustrative life groups in alcohol. Some of the groups represented are oysters and their surroundings,

mussels and theirs, and squids. In the molluscan collection many of the species have alcoholic preparations of the entire animals displayed in the cases beside the corresponding dry shells. Most of the insects on exhibition are in very shallow glass-covered boxes, which are held in frames in such a manner that they may be removed at will. These frames form "A"-shaped tops on table cases. Wings are mounted between glass plates and hung in the windows. A termite nest, more than six feet high, is one of the striking objects in this department.

Russia. — Although I visited museums in St. Petersburg, Moscow, Kazan, Perm, Nijni Tagilsk, Ekaterinburg, Kychtym, Oufa, Kharkow, and Tiflis, all can be dismissed with a few words, because, as a rule, the methods of installation in vogue are not to be recommended. Poorly lighted halls prevail, with flat-topped table cases and high upright and wall cases. These are usually made of pine, with small panes of glass, and inadequate protection from dust. The collections cannot be said to be well classified, except at the universities of Kazan, Moscow, and Kharkow, and at Tiflis. Commendation, however, rather than blame should be rendered the authorities of the smaller towns, because something, at any rate, has been done to get together and preserve objects of interest from the district in which the museum is located, — which is more than has been done by most towns of similar size and importance in countries which consider themselves ahead of Russia in such matters. The evils of faulty classification are illustrated in the mineral collection of the Imperial Mining Institute, in St. Petersburg. This collection has a world-wide reputation for the marvelous size, perfection, and beauty of some of its specimens, but it is difficult to find some of the most noted of these, because the minerals seem not to be arranged according to any system of classification that is recognized in western Europe, England, or America, even those of the same species not being kept together. Labels and locality cards are lacking from a large part of the collection, rendering it in so far useless to the average visitor and greatly lessening its value to the mineralogist.

Naples. — The only geological and mineralogical collections in Naples that are accessible to the public are contained in the

university buildings. They are primarily educational in purpose and are systematically arranged. They contain many fine specimens, among which may be mentioned a grand fossil palm from the Vincenza beds, near Verona, a volcanic "bomb," eighteen or twenty inches in diameter, from the crater rim of Vulcano, one of the Æolian islands, and a leucite crystal, nearly four inches in diameter, from Rocca Monfino. Flat-topped table cases with wooden frames are used in the geological rooms; in the mineralogical rooms such cases are supplemented by upright cases, in which, as so often happens, the upper shelves are far too high for utility. The specimens in the geological rooms are displayed in pasteboard trays, unless they are too large for this method of installation, while those in the mineralogical collection are mounted for the most part on wooden blocks. The Vesuvian collection of the celebrated mineralogist, Prof. C. Scacchi, is preserved in a separate room, to the detriment of the main collection. Such separate collections are the bane of a museum, interfering as they do with the uniform arrangement of the collection on a systematic plan.

Geneva.—The university at Geneva possesses a good museum of natural history in a well-lighted wing of its main building. The departments of geology, mineralogy, conchology, and invertebrate zoölogy, are the best. The rock collection is comprehensive, as one would expect it to be on the borders of the Alps. The hand specimens are displayed in white wooden trays with projecting bases for the labels. The effect is rather clumsy on account of the thickness of the edges of the trays. The de Saussure collection of quartz crystals from the Alps is famous and contains many fine specimens, but it is not well displayed, and poor installation detracts from any collection, no matter how beautiful the specimens may be. The Delessert collection of recent molluscs is here, containing many of Lamarck's types, but the types are not distinguished by means of a noticeable mark, as such important specimens should be. The shells are gummed to cards, a practice which is objectionable on account of the danger of fracture when the shell must be removed from the case for any purpose. The source from which the specimen has come to the museum is indicated by a

letter in the upper left-hand corner of the card on which the shell is mounted. Only a synoptic collection of the shells is on exhibition, — a very few examples of each species and not many species under each genus. In this museum again the upper shelves in the upright cases are much too high for the exhibition of anything but very large specimens which do not require close examination. The fossil shells are placed as near as possible to the groups of recent shells to which they are related.

Paris. Jardin des Plantes. Mineralogy. — The mineral collection is divided into three parts: the general collection; several special collections; some large specimens out of series. The classification recently proposed by Prof. P. Groth, of Munich, is followed in the general collection, with some modifications in minor details. The installation is not modern, the cases being narrow flat-topped table cases surmounted by shallow upright cases, and fully one-fourth of the collection being on shelves too high to be seen with any degree of satisfaction, if at all. Since, however, plans for a new building have already been drawn, it is not worth while to go into an extended criticism of what will soon be discarded. The system of labeling is very complete, each label bearing the name of the species or variety, with one or more synonyms, the chemical formula, the system of crystallization, the mode of occurrence, the locality, and the donor. The peculiar feature about the labels is the statement as to the mode of occurrence, and it is a good one. I quote a sample label from the printed visitor's guide to the collection :

THORITE.

Synonymes : *Thorine silicatée.*

Variétés : *Orangite, Uranothorite.*

Formule Chimique :

Th Si O₄.

Système Cristallin :

Quadratique.

Nature des Gisements :

Pegmatites, Syénites néphéliniques.

The italicized portion of the label is written in by hand, the rest being printed. The specimens are mounted on painted wooden blocks of a pearl gray color. The effect is rather cheap. The labels rest on pins on the sloping fronts of the blocks. Minerals like ruby silver, horn silver, the bromiodides, etc., which are liable to injury from exposure to direct sunlight or to very strong diffused daylight, are placed under covers made of orange brown glass. These, of course, do not improve the appearance of the cases, but they preserve the minerals, and they may be readily removed for the benefit of a student. The foundation of this general collection was laid more than a hundred years ago, hence it has had considerable time in which to grow to its present high state of perfection as to the number of species represented.

Special Collections. — There are seven of these: *A.* Collection of the minerals of France and her colonies. This contains in particular the types described in "The Mineralogy of France," by A. Lacroix, each species, however, being represented by only two specimens. The primary arrangement is by districts. *B.* Technological series. Under this head are brought together those minerals, cut or polished, which are used for ornamental purposes, jewelry, bric-a-brac, etc., such as agate, jade, jadeite, fluor spar, pagodite, etc. *C.* Collection to illustrate the occurrence of minerals. In the general collection the minerals are considered merely as minerals, but in this new collection they are regarded from the point of view of their formation, and are classified according to their occurrence and association in nature. This is a highly instructive and very interesting series, but thus far there have been placed on exhibition only the minerals of igneous rocks, those of sedimentary rocks which have been metamorphosed by contact with igneous rocks, and those of certain calcareous bands in gneiss. *D.* Collection of cut precious stones. The principal specimen in this gem collection is a beautiful blue sapphire weighing 132 carats and cut in rhombohedral form. The series of diamonds comprises about seventy-five crystals. The beauty of the gem collection is marred by its unsatisfactory installation. *E.* The Bischoffsheim collection of diamond crystals. This is kept separate from the

main gem collection. *F.* Collection of artificial minerals. This is in process of formation, a start having been made with a magnificent set of artificial rubies, which were manufactured by the Frémy-Verneuil process. *G.* The Haüy collection. This collection, which has great historical value, comprises several thousands of specimens labeled by the hand of the celebrated founder of crystallography, and is retained just as he left it. The great collection of meteorites is displayed in a case by itself. Most of the small specimens are mounted in wire holders attached to blocks. A printed label on the front of each block gives the history of the specimen in brief, *i.e.*, the kind of meteorite, the date of fall, when known, and the locality where found.

Geology. — The collection to illustrate stratigraphical geology occupies a series of flat-topped table cases running down the middle of the room containing the mineral collection. It is very full in specimens illustrating the geological features of central Europe. The Archæan is illustrated by means of specimens about 4×6 inches in size, of the principal varieties of rocks and of some of the results of dynamo-metamorphism. For the succeeding ages a synoptic collection of fossils is exhibited, together with specimens showing kinds of rocks, dynamic phenomena, etc. The arrangement is primarily chronologic, and under that is geographic. Plaster casts are introduced when good fossils are not available. Light-colored pasteboard trays are used for the specimens. The labeling is very complete. The gallery also of the mineral hall is devoted to geology, and contains a very large rock collection, besides the series of specimens upon which Daubrée and other French geologists have made their classic studies in experimental geology. In this part of the room also the labeling is very satisfactory. The cases, however, are far from dust-proof, and fully one-fourth of the geological as well as the mineralogical exhibit is too high or too low for satisfactory inspection.

Palæontology. — The extensive and important collections of vertebrate and invertebrate fossils occupy the main floor in a new building in the Jardin des Plantes, which was not yet open to the public at the time of my visit. Without going into a

detailed discussion of these celebrated collections, brief mention may be made of some points in their installation. The whole effect is rich, handsome, and pleasing, no expenditure of time or money having been spared by the government or the scientific *attachés* of the department to render the appearance of the hall as attractive as possible. Some might even say that this effort had been carried too far, characteristic French taste having been allowed full play. Tables and desk cases are of oak, and all are comparatively small. The exhibition part of the desk cases has a bronze frame, the bottom of which is covered with silk velour of a reddish terra-cotta color, and most of the specimens are mounted on tablets of heavy manila board ($\frac{1}{8}$ or $\frac{5}{32}$ inch thick) of a light brownish terra-cotta color. As a rule, the large specimens are placed directly upon the velour background without the use of tablets. Simple, handsome supports made of brass wire are much used in both the desk and the upright cases for mounting specimens in the proper attitudes. Minute specimens are cemented to glass squares or rectangles backed by cardboard of the same color as the velour, and the whole placed on the top of a wire support. As far as practicable, at least three specimens are used to illustrate each species of bivalve molluscs, an entire individual being fastened to the middle of the tablet in front, and the opposite detached valves being raised on wire supports on each side of it. Whenever needful or desirable, the specimens have been cut and polished to show the internal structure. The bronze-framed tops are excellent in that they are very tight and dust-proof, and that the frame presents the least possible obstruction to the light and to the view of the visitor, but those in the hall in question are hard to open, and they do not overhang the lower part of the cases. To have the upper part of a desk or table case project beyond the sides of the base for a certain distance (about four inches) is important, because exhibition space is gained thereby, visitors can see the specimens with greater convenience, and the bottom of the case is preserved from injury by boots. The upright cases have iron frames and a bolt lock similar to, if not identical with, the familiar Jenks lock. The backs of these cases are painted a

terra-cotta color of the same shade as the velour in the desk cases. The shelves are of plate glass, with the exception of the bottom one, which is of wood. The matter of labeling has been very carefully attended to, but types and figured specimens are not as prominently marked as they should be in every collection. The arrangement of the fossils is primarily stratigraphical, and then zoölogical by geographical provinces.

L'Ecole des Mines. — The collections of this famous school in all departments of geology are enormous. Wooden-framed cases are used throughout, but the installation is not very recent, and the writer does not know what the feeling of the authorities is toward cases with metal frames. The mineral collection is well labeled, but the classification is such that it is very difficult for a visitor, even though he know something of mineralogy, to find a given species. An attractive feature of the collection is the polished thin sections of minerals, such, for example, as agates, which are framed between glass and hung in the windows. There are many large, showy specimens in the collection, and these, for the most part, are arranged out of series in small rooms. They rest upon blocks, and are provided with printed labels. They are in high wall cases. There is a large and very interesting suite of artificial reproductions of minerals, representing the labors of Daubrée, St. Claire Deville, and others. The table cases have flat tops, and the specimens in them are displayed in pasteboard trays. The meteorite collection consists of small fragments, and is in white trays with blue edges. As would be expected in a mining school, materials of economic importance are well represented in the cases.

In the geological department the general rock collection is apparently very complete, and contains many handsome specimens. It is well arranged in upright cases, but it is defective in point of labels, and therefore is nearly useless to a visitor. The collection to illustrate general geology is very full, and is well arranged and labeled. It consists of a synoptic collection of rocks and fossils, and is classified by geographical provinces as well as by zoölogical subdivisions, under the primary stratigraphic arrangement. The best collection of all in point of

classification, and also in the manner of mounting the specimens, is that of palæontology. The arrangement is primarily zoölogical, and the completeness of the collection in certain departments, *e.g.*, Cephalopoda and Hippuritidæ, is impressive. Most of the specimens are mounted on tablets of manila board, some being kept in place by pins and some by cement. Very small specimens are attached to cards, which are then inserted into glass specimen tubes or vials, where they may be readily examined without being handled, and without danger of loss. The table cases are high and narrow from front to back, and have flat tops. The glass tops are arranged so that the front and sides are lifted up when the case is opened, leaving the specimens exposed as if they were on the top of a table. It is claimed that this is convenient, and that it renders the cases more nearly dust-proof than the usual method of opening. A device that may be recommended to museums in which the storage drawers under the cases were not provided with sliding glass tops when they were built is in use here. It is to groove (rabbet) the upper edge of the drawer all around, so that a glass plate of the right size may be slipped in as a cover. Thumb holes should be provided in the rabbet on two sides of the drawer to facilitate the removal of the glass cover.

London. The British Museum (Natural History).—A volume could be written about the methods of installation employed in different parts of this great institution. So many ideas have been tried here, and information on all points regarding desirable and undesirable methods of installation is so freely given by the officers in charge of the various departments, that it is not too much to say that this is the most important place in Europe for a person to visit who desires to learn what to do and what to leave undone in a museum. I can mention within the limits of these "Notes" only a few of the more striking features of the departments studied.

Palæontology.—Specimens are never crowded, much stress being laid upon the idea that it is better to have first-class specimens well displayed than it is to have all the material in the museum out on exhibition. Printed explanatory labels are full and numerous, and much use is made of drawings, diagrams,

and models, in the cases beside the specimens, to help to a clear understanding of structure. As examples of this feature, mention may be made of the crinoids, the brachiopods, and the cephalopods. Glass models of living cephalopods and corals are used in connection with the labels, explaining the structure of those groups of animals. Gaps in the series on exhibition are filled by drawings until the desired specimens can be obtained. Type and figured specimens are carefully and prominently marked with discs of emerald green paper gummed to them. Manila board tablets about $\frac{5}{8}$ of an inch thick, with light cream-colored surface, are now used in the cases. Pins are used for the most part instead of cement for keeping specimens in place. Species are divided off by means of strips of wood. The lower part of upright cases is utilized by putting in a false back and secondary shelves which bring the specimens close to the glass. None but large specimens, which do not require close inspection, are placed on the upper shelves of the upright cases. The drawers under the table cases are provided with sliding glass tops which protect their contents from dust and at the same time permit easy general inspection. The new floor cases have "A"-shaped tops, and for some forms of fossils which can be permanently attached to cards or mounted in trays or glass-topped boxes, these cases are excellent. A false bottom brings the specimens directly beneath the glass into good position for observation. All the cases have mahogany frames, metal frames not having found favor yet in this museum. The arrangement of the collection is primarily zoölogical, but under the zoölogical subdivisions the specimens are arranged according to geologic age and geographic provinces. A very large part of the material on hand is not on exhibition, being stored in accessible drawers as a study collection. The series of fossil plants is a very noteworthy portion of the department. One large gallery is devoted to the stratigraphic collection of British sedimentary rocks, and to nine collections of historic and palæontologic interest bearing upon the early history of the British Museum, and the study of geology and palæontology in Great Britain. The stratigraphic collection gives a continuous section of the sedi-

mentary deposits, from the most recent on the east coast to the most ancient on the west, and includes numerous small sections of the strata observed and recorded by various geologists in different parts of England. There is also a series of small maps, colored to show the exposed area of each geologic formation, and placed next to the case containing the specimens illustrating that formation. The most important of the nine "type" collections are those bearing the names of Sowerby, Gilbertson, S. V. Wood, F. E. Edwards, and Thomas Davidson. The last three alone would be enough to establish the preëminence of the museum in invertebrate palæontology.

Mineralogy.—The collection of minerals is probably the finest and most complete in the world. The aim of the trustees is to show all the definite mineral species that are known, in all their varieties of crystalline form, modes of occurrence, and associations with one another. They also aim to have specimens from all noteworthy localities, and it is a "special object that examples of each mineral species show its most complete development, whether in magnitude or perfection of crystals, in the color and limpid purity, or in any other important quality which may belong to it in its more exceptional occurrence." In a wall case just outside the entrance to the main mineral gallery there is a very attractive display of polished samples of some of the rocks and minerals which are used for ornamental purposes. The main hall or gallery is cased entirely with mahogany desk cases, except for four mahogany wall cases, two at each end of the room. The mineral collections include a series introductory to the study of minerals, embracing a set of specimens illustrating the growth of some of the ideas now considered fundamental in the science, and other sets of fine specimens showing the characters of minerals (their crystalline form, color, lustre, degree of transparency, streak, cleavage, etc.), and illustrating the terms used in their description; the systematic collection of species and varieties; enclosures in minerals; a series of crystals, natural and artificial; and a large number of pseudomorphs. The mineral specimens which are too large for exhibition in the desk cases are installed in wall cases in a room called the "pavilion," beyond

the main gallery. This pavilion also contains the collection of pseudomorphs and paramorphs, the Ruskin collection of forms of silica, and the famous collection of meteorites.

The specimens in the desk cases are mounted on tablets, and are never crowded. These tablets are of wood, with a very narrow rim, which is painted black. The main portion of the block is covered with a sheet of the finest quality of jeweler's cotton wool, which is held in place by being forced down into a groove provided for the purpose just within the raised rim. These tablets are very effective in appearance; they do not change color, and dust does not show readily on them, and specimens are not apt to slip on them. Group labels, and labels for particularly showy specimens, are printed with pen and India ink on white celluloid plates of appropriate size, and attached to the blocks on which the specimens rest, or are raised on suitable supports. When there are many specimens of the same species, they are grouped together within strips of wood of a given color. The use of these strips of colored wood gives a means of ready and rapid comparison. The strips are painted different colors on the two sides, so that one strip may answer for a partition. Minerals like proustite, the bromiodides, etc., which are liable to injury by long exposure to strong light, are covered with neat wooden boxes bearing the name of the species on the outside. Persons desiring to examine such specimens get permission to do so on application at the office of the department. A cloth screen rests on the top of the cases over other minerals which it is desirable to keep in the shade. This may be removed and replaced by the visitor himself. To provide against leaving cases unlocked, the locks are so arranged that the key cannot be removed from them without throwing the bolt. Cut gems are displayed in their systematic position in the general collection, there being no special "gem cases." The gem of the gems is a South African diamond crystal of very symmetrical form, weighing 130 carats. Much use is made of wire holders and supports for getting specimens into proper position for display. The system of classification followed is essentially that based on chemical composition and crystalline form, propounded by

Gustav Rose in 1852. Recent additions are exhibited for a time in a case provided for the purpose, before they are distributed in the general collection.

The great collection of rocks is arranged in the Mineral Gallery, on account of the close relationship between minerals and rocks, and consists of the regulation hand specimens about 4 x 6 inches in size, mounted on tablets in desk cases, and large specimens illustrating rock masses, installed in wall cases at one end of the room. A new feature of the collection, and one of the highest importance in such a branch of science as petrology, is the series of specimens introductory to the study of rocks. This series illustrates the gradual development of the science, and the terms used in the description of rocks as far as is practicable by means of specimens. Printed descriptions are displayed beside the specimens, so that they supplement each other in a very clear manner. It is not likely that the general public takes very much interest yet in such collections of rocks, but the demand for information on the subject of petrology is on the increase, as is shown by the testimony at the various museums mentioned in these notes, in which rock collections are on exhibition, and especially where the general collection is supplemented by an adequate introductory and explanatory series of specimens.

The series of guidebooks published by the British Museum is a highly commendable feature of the institution. These little books, of which fourteen are now issued for the various departments of natural history, are valuable aids to any one examining the collections. A few of them are intended merely as indexes to the collections described, but most of them are veritable text-books in popular though accurate language introductory to the department of science treated, making the most direct use from page to page of the specimens on exhibition in the cases. They are models of what explanatory guidebooks should be, and their prices are so low as to bring them within the means of all persons interested.

The Jermyn Street Museum.—The "Museum of Practical Geology," in Jermyn Street, contains the collection of the Geological Survey of the United Kingdom. In scope it is

confined to the British Isles and, as its name indicates, it seeks to show, as far as possible, the bearing of geology on everyday life. It contains much to illustrate the use of geological materials in art and industry, hence there are many manufactured articles on exhibition. The building is far too small for the proper display of the exhibition material on hand, and, therefore, the authorities cannot carry out their ideas regarding installation. The palæontological collection is very rich, and is arranged, as closely as may be, to illustrate the geological map of the kingdom in process of preparation by the survey. As at the British Museum, the types and figured specimens are marked by means of little discs of emerald green paper gummed conspicuously to them. The effect of a large part of the excellent collection of building stones is injured because the cubes are displayed in desk cases. Stratigraphic geology and petrology occupy a room together. The case introductory to the general rock collection contains a series of specimens to illustrate the meaning of the commonest terms employed in describing rocks, supplemented by enlarged microscopic drawings of thin sections of rocks. Such enlarged micro-drawings are also displayed beside many of the hand specimens in the general collection. A very interesting case in this room is that in which are displayed specimens to show the effects upon rocks of the surface action of various agents, such as ice, wind, and water. Photographs and other pictures form a very valuable adjunct to this series. In another compartment of the case one may see the effects which highly heated and molten rocks have produced upon the rocks with which they have come in contact. Cut gems are not wholly separated from the mineral species to which they belong, but are displayed in the case containing the principal show specimens of the mineral collection. The Ludlam collection is a series of very choice mineral specimens mounted on blocks in flat-topped, bronze-framed cases. New acquisitions to any department of the museum are displayed for a time by themselves before they are distributed to their permanent places.

Cambridge. The Woodwardian Museum. — The famous collections in this museum are so crowded into an unsatisfactory

building, that one gets very few hints as to general installation. The collections are entirely geological and palæontological, and the material is magnificent, especially that collected and prepared by Mr. Henry Keeping. Types and figured specimens are very carefully preserved, and a list of them was prepared and published as an octavo volume of 180 pages in 1891. These specimens are mounted on tablets of a different color from those used for other specimens. At one time pink was used, but now dark blue is employed. This method distinguishes the types with great readiness, to be sure, from the other specimens in a case or drawer, but it produces a bizarre effect upon the appearance of the collection, and specimens are in danger of losing their identity, if they are removed from their tablets for any reason, or if they become detached through accident. The tablets are made of manila board about $\frac{1}{8}$ of an inch thick. Specimens loaned to go out of the building always have a distinctive museum label gummed to them before they are taken away. The drawers used for storage and study collections are provided with sliding glass tops. Many interesting problems have been worked out or illustrated by means of the material in this museum; one of these is the arrangement of certain series of specimens to show the insensible gradation between related species and genera. Inasmuch as this museum is intended primarily for the student and the investigator, most of the collections are arranged with their convenience directly in view. The museum has a few special collections which must be kept together intact, by the provisions of their donors. The museum authorities have been striving for years to procure funds for a new building, and it is to be hoped that they will succeed before anything injurious happens to the valuable material under their care.

In closing these brief notes, the author wishes to disclaim having any thought that they are complete. He has not undertaken to mention all the good features of the museums visited, but has only tried to present some of the salient points that presented themselves in an all too hurried tour. Among the general considerations that come up most prominently out

of the mass of notes are the following: India ink is the only suitable medium to use for preparing pen-written labels, and great care must be exercised in the selection of type for printed labels, so that they may be readily and perfectly legible. Celluloid makes a handsome material on which to prepare certain showy labels, though some object to it on account of its inflammable nature. Certainly numbers of celluloid plates ought not to be stored together anywhere about a museum. Labels for individual specimens should be concise, clear, and brief, while those for groups should be more explanatory in character. Series introductory to the general collections are of the highest value in a public museum, and should be well supplied with diagrams, figures, charts, and explanatory labels, to make their meaning clear to the average visitor. Brass wire is a most useful thing for making supports of all forms for specimens and labels. The top and bottom shelves of most upright and wall cases can be well utilized only for large specimens and masses which do not require close inspection. Wooden blocks can be used to good advantage for the installation of specimens only in upright and wall cases, and then are best adapted to minerals. Tablets of manila board from about $\frac{5}{8}$ of an inch in thickness are an excellent mount for most fossils, though trays and glass-covered boxes and glass tubes are necessary for some forms. The manila tablets should be covered with paper of some light color that will not fade. Light cream color is now being used in the British Museum, but French gray is considered by most persons to be the most durable color. White is not at all lasting. Fragile specimens, or those with a thin epidermis, should not be cemented to tablets, but should be kept in place by means of pins. In general, it is best to mount specimens in such a manner as to permit of their ready removal for close examination or study. Metal frames for cases have found much favor on the Continent of Europe, and they certainly have a great advantage in that the framework presents the least possible obstruction to light and vision; but they are difficult to make and to handle, and they do not produce as good an architectural effect in a gallery as wooden cases.